

# Hydraulic Fracturing Modeling with Discrete Element Method: The Good, The Bad, and The Ugly

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Multi-stage hydraulic fracturing has been the major factor allowing for the successful exploitation of tight gas, shale gas, and other unconventional resources since the middle of the 2000s. Driven by the increasing research interests in this area, there have been significant improvements in the understanding of critical physical processes and advances in numerical methods used in the field of unconventional hydraulic fracturing.

Particle based discrete element method (DEM) specializes in the micromechanical modeling of rock behavior. Rock can be considered as an assembly of bonded particles at the microscale. The fluid driven non-planar fracture propagation process is then an emergent behavior of bonding breakage in either tensile or shear modes. Another big advantage of DEM modeling for hydraulic fracturing is the capability of handling geological discontinuities and/or discrete fracture network. However, the DEM modeling is also subjected to the shortcoming of computational efficiency and accuracy issue. In this talk, we will review the “good”, the “bad” and the “ugly” things with regard to hydraulic fracturing modeling with DEM.

## References

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